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Geographic Analysis and Monitoring Program

Carbon Sequestration Project

Statement of Problem

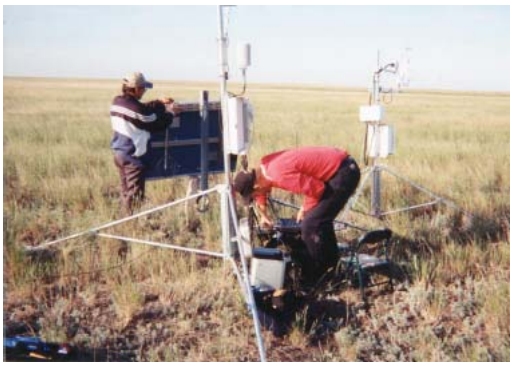
The ability of some plant communities to absorb CO_2 and store a portion of it for decades has been proposed in the Kyoto protocol as a possible mechanism to help offset fossil fuel CO_2 emissions. The monitoring of carbon sequestration may lead to mechanisms for the certification of sequestered carbon and economic rewards for carbon-oriented land management. Remote sensing and GIS technologies may provide the only practical means to quantify carbon flux over large areas.

Objectives

This activity uses remotely sensed data and carbon flux information from meteorological towers to develop algorithms that will support spatial extrapolation of net carbon fluxes over rangeland systems. An equal objective is to combine land cover, C pool measurements and biogeochemical modeling to estimate carbon sequestration in semi-arid Africa.

Relevance and Impact

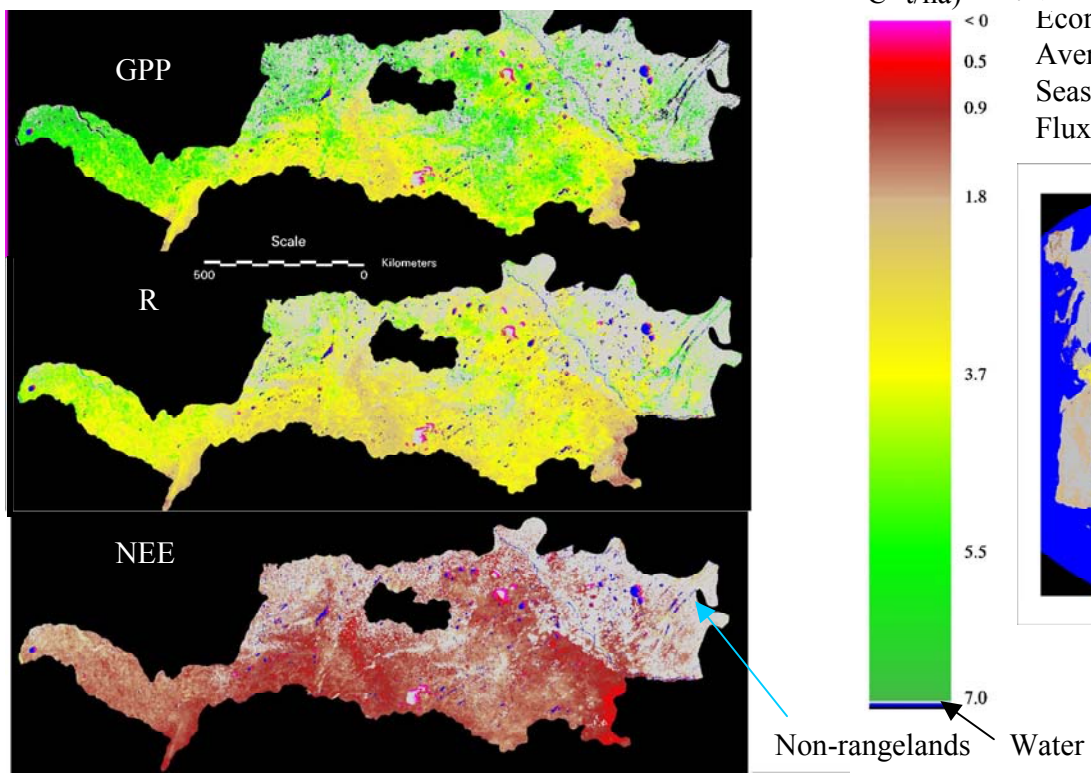
Temporal and spatial estimates of rangeland flux can be compared with other flux estimation and mapping products (MODIS or physically based models). Estimates of carbon fluxes can be used to quantify the variability of expansive rangeland carbon flux, and contributes to refining global carbon budgets. These Carbon flux maps could be used to focus management scenarios that promote carbon. These modeling efforts also will identify the driving forces of carbon fluxes on northern hemisphere rangelands. Efforts are focusing on quantifying winter fluxes as well, if reliable estimates of wintertime fluxes can be obtained from towers.



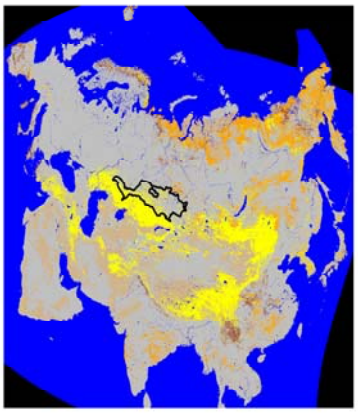
Strategy and Approach

The activity has been expanded from rangelands in Central Asia to the Western United States. The USAID/CRSP project combines work on site by the USDA/ARS (Utah State University and University of California, Davis) with local expertise and ground data from the ARS rangeland flux net participants. SPOT VEGETATION data and MODIS data will be used to provide vegetation

GPP, Respiration, and NEE for the Kazakh Steppe May – Oct. 2000



Ecoregion Wide Average Growing Season Rangeland C Flux: 1.27 C (Mg C ha^{-1} y^{-1})



indices from the footprints of the flux towers and establish algorithms for index driven models, which will then be extrapolated over the geographic extent of that biome type. Current research indicates NDVI is more strongly related to GPP than daytime carbon flux or 24-hour carbon flux, strengthening spatial extrapolations. GPP estimates are derived from the 20-minute carbon flux tower data using light curve equations. Another aspect of the strategy is to evaluate the appropriateness of carbon stock measurements in combination with simulation modeling to estimate the sequestration potential in semi-arid Africa. This is being developed with multiple partners in Senegal.

For More Information

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